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Evaluation of New Canal Point Sugarcane Clones

2000–01 Harvest Season

ABSTRACT

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Twenty-nine replicated experiments were conducted on 9 farms (representing 5 organic soils and 2 sand soils) to evaluate 44 new Canal Point (CP) clones of sugarcane from the CP 96, CP 95, CP 94, and CP 93 series. These experiments compared the cane and sugar yields of the new clones, complex hybrids of *Saccharum* spp., with yields of CP 70–1133, formerly a major sugarcane commercial cultivar on organic soils and now the third most widely grown cultivar on sand soils in Florida. Each clone was rated for its susceptibility to diseases and cold temperatures.

The audience for this publication includes geneticists, researchers, growers, extension agents, and individuals in industry who are interested in sugarcane clone development.

Keywords: Histosol, muck soil, organic soil, *Puccinia melanocephala*, *Saccharum* spp., stability-safety index, sugarcane cultivars, sugarcane rust, sugarcane smut, sugar yields, sugarcane yields, *Ustilago scitaminea*.

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2000–01 Harvest Season

B. Glaz, P.Y.P. Tai, J.C. Comstock, J.D. Miller, and R. Gilbert

Clonal selection at precommercial stages helps support the commercial production of sugarcane, complex hybrids of *Saccharum* spp. Although production of sugar per unit area is a principal selection characteristic, it is not the only factor on which sugarcane is evaluated. In addition, analyses are made on the concentration of sugar and on the fiber content of the cane. Since sugar yield is not the only economic factor on which sugarcane yields are judged, several of the clones with high yields of sugar per hectare have never become commercial cultivars. Deren et al. (1995) explain mathematically how clones are evaluated.

The time of year and the duration that a clone yields its highest amount of sugar per unit area can be very important, since sugarcane harvest seasons extend from fall to spring. Because sugarcane is commercially grown in plant and ratoon crops, clones are evaluated accordingly. Adaptability to mechanical harvesting and mechanical seed cane cutting are important traits in Florida.

Information about the stability of a clone's performance aids in selecting clones that will yield well across all or many environments. Stability measurements also enable identification of clones that will perform well only in some environments. This stability factor is important in our evaluations because of the wide range of environments for growing sugarcane in Florida. As differences widen for such characteristics as temperature, moisture, and soil, region-specific clones become necessary because few clones produce high yields in markedly different environments.

Clones with desired agronomic characteristics must also be productive in the presence of harmful diseases, insects, and weeds. Some pests rapidly develop new, virulent races or strains. Because of these changes in pathogen populations, clonal resistance cannot be considered permanent. The selection team must try not to discard clones that have sufficient resistance or tolerance to pests, but it must also discard clones that are too susceptible to pests to be grown commercially. Sugarcane growers in Florida rely much more on tolerance than resistance to sugarcane diseases. In the 2000 growing season, the top six cultivars made up 79 percent of the total Florida sugarcane hectarage; cultivars were not specified for the other 21 percent (Glaz 2000). Each of these six cultivars, CP 80–1743, CP 72–2086, CP 80–1827, CP 78–1628, CL 61–620, and CP 73–1547 was susceptible to one or more of the following sugarcane diseases: rust, mosaic, leaf scald, smut, or ratoon stunt disease (RSD). Glaz et al. (1986) presented a formula and procedure to help growers distribute their available sugarcane cultivars while considering possible attacks of new pests.

The disease that has caused the most difficulty in selecting resistant sugarcane cultivars has been sugarcane rust, caused by *Puccinia melanocephala* Syd & P. Syd. Florida sugarcane growers and scientists have had the most success in selecting resistant cultivars for sugarcane smut, caused by *Ustilago scitaminea* Syd and P. Syd. Other diseases they must contend with are leaf scald, caused by *Xanthomonas albilineans* (Ashby) Dow; yellow leaf virus, a disease caused by a luteovirus (Lockhart et al. 1996); and sugarcane

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mosaic virus. Ratoon stunt disease (RSD), caused by *Clavibacter xyli* subsp. *xyli Davis, Gillaspie*, *Vidaver*, and *Harris*, has probably been the most damaging, although the least visible, sugarcane disease in Florida. A program to improve resistance of CP cultivars to RSD is progressing well (Comstock et al. 2000). Some growers minimize losses from RSD by using hot-water treatments to obtain disease-free seed cane. Scientists at Canal Point screen clones in their selection program for resistance to rust, smut, leaf scald, mosaic, RSD, and eye spot. Eye spot, caused by *Bipolaris sacchari* (E.J. Butler) Shoemaker, is not currently a commercial problem in Florida.

Damaging insects in Florida of long duration are the sugarcane borer, *Diatraea saccharalis* (F.); the sugarcane wireworm, *Melanotus communis*; and the sugarcane grub, *Ligyrus subtropicus*. An insect discovered in Florida in 1990, the sugarcane lace bug, *Leptodictya tabida* (Hall 1991), has also become a pest, selectively feeding on some clones. In 1994, another insect pest new to commercial sugarcane fields in Florida was found—the West Indian cane weevil, *Metamasius hemipterus* (L.) (Sosa 1995).

Geneticists at Canal Point are working to incorporate borer resistance into the breeding program by selecting for leaf pubescence (a trait known to promote resistance) in elite sugarcane clones (Sosa 1996). Currently, there are no known commercial sugarcane cultivars with pubescent leaves.

There are often winter freezes in the region of Florida where much of the sugarcane is produced. The severity and duration of a freeze and the specific sugarcane cultivar are the major factors that determine how much damage occurs. The damage caused by such freezes ranges from no damage to death of the mature sugarcane plant. The rate of deterioration of juice quality after a freeze depends on the ambient air temperature; the warmer the temperature, the more rapid the deterioration in juice quality will be of plants that have been exposed to freezing temperatures. Freezes also damage young sugarcane plants. Stalk populations may decline after severe freezes kill aboveground parts of recently planted and emerged sugarcane plants.

Each year at Canal Point, up to 100,000 seedlings are evaluated from crosses derived from a diverse germplasm collection. (However, reports from Mangelsdorf (1983) and Deren (1995) contend that the genetic base of U.S. sugarcane breeding programs is too narrow). This year, most of the parental clones in our program originated from Canal Point. In addition, clones used as parents this season came from Hawaii, Louisiana, Texas, El Salvador, India, Iran, and the People's Republic of China. Also, we used several feral *Saccharum officinarum* and *Saccharum robustum* clones and interspecific hybrids of these clones as parents.

About 20 percent of 50,000 seedlings from the seedling stage were advanced to the stage I phase in 2001 where about 10 percent of the 10,000 clones are expected to be advanced to stage II. The 1,000 clones in stage II were visually selected in the seedling and stage I phases. Once selected as seedlings, clones are vegetatively propagated. From this stage on in the selection program, all reproduction is vegetative. Each plant (clone) is genetically identical to its precursor, assuming no mutations or the unlikely stalk growth from the formation and germination of true seeds in our plots. From these 1,000 selected clones in stage II, about 130 are selected for continued testing in replicated experiments. Each of the first three stages, seedling, stage I, and stage II, are evaluated for 1 year in the plant-cane crop at Canal Point. The primary selection criteria for stage II and all subsequent stages are sugar yields, cane tonnage, and disease resistance.

The stage III clones are evaluated for 2 years in the plant-cane and first-ratoon crops, at four locations, all in commercial sugarcane fields. Until last year, the 11 most promising clones received continued testing for 4 more years in the stage IV experiments. Beginning with the 2000 planting season, the number of clones advanced from stage III to stage IV increased to 14, based on conclusions by Brown and Glaz (2001). Tai and Miller (1989) also described this selection program from

the seedling to the stage IV phase. Clones that successfully complete these experimental phases undergo 2 to 4 years of evaluation and seed-cane increase by the Florida Sugar Cane League, Inc., before commercial release. Some of this evaluation occurs concurrently with the evaluations described here.

Clones with characteristics that may be valuable for sugarcane breeding programs are identified throughout the selection process. Sugarcane geneticists in other programs often request clones from Canal Point. From May 2000 to April 2001, CP clones or seeds were requested from and sent to Australia, Costa Rica, Dominican Republic, Ecuador, Fiji, France, Guatemala, Morocco, Nicaragua, Pakistan, People's Republic of China, Switzerland, Thailand, and Venezuela. Alabama, Arkansas, California, Delaware, Louisiana, Maryland, Mississippi, New York, Texas, and Virginia, and five other locations in Florida also received CP clones.

TEST PROCEDURES

In 29 experiments, 44 new CP clones (11 clones of the CP 96 series in the plant-cane crop, 10 clones of the CP 95 and 1 clone of the CP 94 series in the plant-cane and first-ratoon crops, 11 clones of the CP 94 series in the first- and second-ratoon crops, and 11 clones of the CP 93 series in the second-ratoon crop) were evaluated at 9 farms.

CP 70–1133 was the reference clone in all 29 experiments. CP 70–1133 was the third most widely grown cultivar on sand soils but only a minor cultivar on organic soils in Florida. Overall, CP 70–1133 was the ninth most widely grown sugarcane cultivar in Florida in the 2000–2001 harvest season (Glaz 2000), though for several years was the most widely grown cultivar in Florida.

The second-ratoon experiment at A. Duda and Sons', Inc. (Duda), southeast of Belle Glade, was conducted on a Dania muck soil. As described by McCollum et al. (1976), Dania muck is the shallowest of the organic soils consisting primarily of decomposed sawgrass (*Cladium jamaicense* Crantz) in the Everglades Agricultural Area. The maximum depth to the bedrock in a Dania muck is 51 cm. The other organic soils similar to Dania muck are Lauderhill (> 51 and ≤ 91 cm depth to bedrock), Pahokee (> 91 and ≤ 130 cm depth to bedrock), and Terra Ceia mucks (organic layer > 130 cm).

The plant-cane and CP 94 experiments at Okeelanta Corporation (Okeelanta) south of South Bay were conducted on Lauderhill muck soils. Also, the first-ratoon experiment at Knight Management, Inc. (Knight) southwest of 20-Mile Bend in Palm Beach County, the first-ratoon and both second-ratoon experiments at Sugar Farms Co-op Eastern Division (SFCE) near 20-Mile Bend, as well as the plant-cane and first-ratoon experiments at Wedgworth Farms, Inc. (Wedgworth) east of Belle Glade were conducted on Lauderhill mucks.

The second-ratoon experiment at Sugar Farms Co-op Western Division (SFCW) east of Canal Point, as well as the plant-cane and second-ratoon experiments at Knight, the CP 95 first-ratoon and the CP 93 second-ratoon experiments at Okeelanta, the plant-cane experiment at SFCE, and the second-ratoon experiment at Wedgworth were planted on Pahokee muck soils. The plant-cane and first-ratoon experiments at SFCW were conducted on Terra Ceia muck soils.

The three experiments at Eastgate Farms, Inc. (Eastgate) north of Belle Glade were on Torry mucks, the three experiments at Hilliard Brothers' of Florida Ltd. (Hilliard) west of Clewiston were on Malabar sands, and the three experiments at Lykes Brothers' Farm (Lykes) near Moore Haven in Glades County were on Pompano fine sands.

The CP 95 plant-cane, the CP 94 first-ratoon, and the CP 93 second-ratoon experiments at Okeelanta were planted on fields in successive sugarcane rotations. The other experiments were planted in fields that had not been cropped to sugarcane for about 1 year. In all experiments, clones were

planted with two lines of seed cane per furrow in plots arranged in randomized complete-block designs with eight replications. Each two-row plot was 10.7 m long and 3 m wide (0.0032 ha). The distance between rows was l.5 m, and 1.5-m alleys separated the front and back ends of the plots. Outside rows of most plots were bordered by one row of the same clone as planted in the plot. An extra 1.5 m of sugarcane protected the front and back of each test.

Samples of 10 stalks per plot were cut from unburned cane from all plots in each experiment between October 14, 2000 and March 18, 2001. In all experiments, one sample per plot was cut from the middle row of each plot. In addition, preharvest samples were cut from two replications of 10 plant-cane experiments on October 12, 19, 21, 23–25, and 30, 2000. For all samples, once a stool of sugarcane was chosen for cutting, the next 10 stalks in the row were cut as the 10-stalk sample. The range of sample dates for each crop was as follows:

Plant-cane crop	December 5, 2000 to March 18, 2001
First-ratoon crop	October 25, 2000 to January 23, 2001
Second-ratoon crop	October 14, 2000 to January 18, 2001

After the stalk samples were transported to the Agricultural Research Service's laboratory at Canal Point for weighing and milling, crusher juice samples from the stalks were analyzed for Brix and pol, and theoretical recoverable yields of kg 96^{o} KS/T (sugar per metric ton of cane) were determined as a measure of sugar content. The procedure used to calculate these yields using fiber percentages is described by Legendre (1992).

Total millable stalks per plot were counted between June 9, 2000 and September 14, 1999. Yields of TC/H (metric tons of cane per hectare) were calculated by multiplying stalk weights by number of stalks. Theoretical yields of TS/H (metric tons of sugar per hectare) were calculated by multiplying TC/H by KS/T and dividing by 1,000.

The clones were inoculated in stage II plots to determine eye-spot susceptibility. Before the clones were evaluated in stage IV, they were tested separately by artificial inoculation for susceptibility to sugarcane smut, sugarcane mosaic virus, leaf scald, and RSD. Once they advanced to stage IV, separate artificial-inoculation tests were repeated. Each clone was then rated for its reactions to natural infection by sugarcane smut, sugarcane rust, sugarcane mosaic virus, and leaf scald. Agronomic practices, such as fertilization, pest and water control, and cultivation, were conducted by the landowner in whose field each experiment was planted.

Two separate tests were conducted at Gainesville to determine cold tolerance of clones from the CP 93, CP 94, CP 95, and CP 96 series. These tests were conducted at the Florida Institute of Food and Agricultural Sciences Greenacre Agronomy Farm and the Hague Farm. The experiments were planted in randomized complete blocks with six replications. Plots were 1.5 m long and 2.1 m wide. The temperature dropped to below –3.9 ^{o}C on November 22–23, 2000 and December 18, 20–21, and 31, 2000. Stalk samples were cut for analyses of sucrose content on November 30, 2000 and January 11, 2001. The cold-tolerance ranking was based on deterioration of juice quality after the freeze damage to mature sugarcane stalks. However, the clones had considerable differences in maturity at the time of the freezes and samples. Level of maturity probably affected degree of cold injury and subsequent deterioration of juice quality.

In addition, the CP 96 plant-cane experiment at Okeelanta was exposed to freezing temperatures. Cold temperatures were recorded about 1 km from the experiment as follows: December 31, 2000, –1 ^{o}C for 10 min and 4 h below 0 ^{o}C; January 1, 2001, –4 ^{o}C for 30 min and 11 h 40 min below 0

°C; and January 4, 2001, –4 °C for 2 h 40 min and 9 h below 0 °C. Ten-stalk samples were collected weekly from two replications from January 9 to March 5, 2001. The yields of kg KS/T (sugar per metric ton of cane) were calculated for all samples and titratable acidity (Irvine 1964) was determined for samples collected on the first and final two sample dates. These results were used in addition to the information collected at Gainesville to determine cold-tolerance ratings for the clones in the CP 96 series.

Analyses of variance were done using procedures described by McIntosh (1983). F-ratios were chosen according to a mixed model, with clones fixed and locations random. The source of variation that corresponded to the error term for the effect being tested was used to calculate the least significant difference (*LSD*). *LSD* was used, regardless of significance of F-ratios in all analyses, to protect against high type-II error rates. Significant differences were sought at the 10-percent probability level (Glaz and Dean 1988). Analyses of variance were calculated with SAS (SAS 1985).

Analyses of clonal stability across locations were done by using procedures recommended by Shukla (1972). The higher the stability estimate, the less stable the clone. Therefore, a clone with a low stability value would most likely produce relatively constant yields across locations.

RESULTS AND DISCUSSION

Table 1 lists the parentage, percent fiber, and reactions to smut, rust, leaf scald, mosaic, and RSD diseases for each clone included in these experiments. Tables 2–5 contain the results of the CP 96 plant-cane experiments, and tables 6–7 contain the results of the CP 95 plant-cane experiments. Tables 8–10 contain the results of the CP 95 first-ratoon experiments, and tables 11–12 contain the results of the CP 94 first-ratoon experiments. Tables 13–15 contain the results of the CP 94 second-ratoon experiments, and tables 16–18 contain the results of the CP 93 second-ratoon experiments. Table 19 lists cold-tolerance ratings for the clones in the CP 93, CP 94, CP 95, and CP 96 series. Table 20 lists the dates that stalks were counted in each experiment.

Plant-Cane Crop, CP 96 Series

When averaged across all six locations, CP 96–1602 was the only clone that yielded significantly more TS/H (metric tons of sugar per hectare) than CP 70–1133 (table 5). The yield of TC/H (metric tons of cane per hectare) of CP 96–1602 was higher, but not significantly different from that of CP 70–1133 (table 2). CP 96–1602 had significantly higher mean yield of harvest (table 4) and nearly higher yield of preharvest (table 3) kg of KS/T (sugar per metric ton of cane) than CP 70–1133. However, the harvest KS/T yields of CP 96–1602 were relatively unstable across locations. The harvest KS/T yields of CP 96–1602 were particularly low at Knight and not as high, relatively, as at other locations, such as Lykes Bros. (table 4).

Three new clones—CP 96–1300, CP 96–1290, and CP 96–1171—yielded more, but not significantly different TS/H yields than CP 70–1133 (table 5). The TS/H components of all three new clones were similar to those of CP 70–1133. They had similarly high yields of TC/H (table 2) and similarly low yields of KS/T (tables 3 and 4).

Five new clones—CP 96–1252, CP 96–1161, CP 96–1350, CP 96–1288, and CP 96–1686—yielded less, but not significantly different TS/H than CP 70–1133 (table 5). CP 96–1252 and CP 96–1161 had TC/H and KS/T yields similar to those of CP 70–1133 (tables 2 and 4). CP 96–1350, CP 95–1288, and CP 96–1686 all yielded significantly more KS/T (table 4) but significantly less TC/H than CP 70–1133 (table 2). The preharvest KS/T yield of CP 96–1686 was also significantly higher than that of any other clone, except CP 96–1253 (table 3).

Increases of seed cane of all of the previously mentioned CP 96 series clones except CP 96–1161 and CP 96–1288 were started for potential release (table 1). CP 96–1161 is too susceptible to smut and rust and CP 96–1288 is too susceptible

to mosaic for commercial use (table 1). Other disease susceptibilities of concern are the ratings of too susceptible for commercial production assigned to CP 96–1300 and CP 96–1602 for smut, and CP 96–1300 for RSD. The smut rating for CP 96–1602 may be reduced if it is determined that the clone planted at Duda is not CP 96–1602, a matter that is currently being investigated. CP 96–1350 and CP 96–1300 were the two new clones from this group with the most tolerance to cold weather (table 19). Fiber percentages for the CP 96 series clones selected to be increased ranged between 8.58 (CP 96–1171) and 10.71 percent (CP 96–1300).

Plant-Cane Crop, CP 95 Series

Last year's report contained the results from seven locations of the CP 95 series plant-cane crop (Glaz et al. 2001). This year, results are available from three additional locations (tables 6 and 7). Except for CP 95–1726, which had a very low TS/H yield, all CP 95 clones and CP 70–1133 had similar mean TS/H yields (table 7). However, CP 95–1039, an outstanding clone from last year's plant-cane results, yielded significantly more TS/H than CP 70–1133 on the Torry muck at Eastgate and on the Malabar sand at Hilliard. At both locations, these high TS/H yields were due mostly to outstanding yields of TC/H (table 7). CP 95–1569 had a very high TS/H yield at Hilliard (table 7). This high TS/H yield was due to its TC/H yield, which was significantly higher than that of any other clone at Hilliard (table 7). The mean KS/T yield across all three locations was moderately high for CP 95–1569, but its mean KS/T yield, as well as its KS/T yield at Hilliard, were significantly lower than the corresponding KS/T yields of CP 70–1133 (table 6).

First-Ratoon Crop, CP 95 Series

When averaged across all seven locations, CP 95–1569 was the only clone that yielded significantly more TS/H than CP 70–1133 (table 10). CP 95–1569 also yielded significantly more TS/H than all other clones except CP 95–1039 and significantly more TC/H than all other clones (tables 8 and 10). The KS/T yield of CP 95–1569 was low but similar to that of CP 70–1133 (table 9). The TS/H yield of CP 95–1569 was high, but not significantly greater than that of CP 70–1133 last year (Glaz et al. 2001).

CP 95–1039 and CP 95–1570 had yields of TC/H and TS/H that were similar to those of CP 70–1133 (tables 9 and 11). The KS/T yields of CP 95–1039 and CP 70–1133 were also similar, but the KS/T yield of CP 95–1570 was significantly lower than that of CP 70–1133 (table 10). The TC/H and subsequently the TS/H yields of CP 95–1039 were unstable across locations (tables 9 and 11). Last year, yields were similar for CP 95–1039 and CP 95–1570 as plant cane, except that the CP 95–1039 yields were more stable (Glaz et al. 2001).

Seed cane of CP 95–1039, CP 95–1569, and CP 95–1726 is being increased for potential release (table 1). CP 95–1039 was rated as the clone with the most cold tolerance in the series (table 19). CP 95–1726, CP 70–1133, and CP 95–1569, ranked fifth, sixth, and eighth in cold tolerance, respectively. The only serious disease susceptibility among them was CP 95–1726's susceptibility to smut (table 1). However, these three clones also had low levels of susceptibility to diseases as follows: CP 95–1039, smut; CP 95–1569, leaf scald and RSD; and CP 95–1726, mosaic. CP 95–1569 had a high fiber percentage and CP 95–1039, CP 95–1726, and CP 70–1133 had similar fiber percentages.

First-Ratoon Crop, CP 94 Series

Last year's report contained CP 94 series results from six locations for the first-ratoon crop and from three locations for the plant-cane crop (Glaz et al. 2001). This year, results are available from first-ratoon cane from the three locations that were plant cane last year (tables 11 and 12). No new clone had a significantly higher mean TS/H yield than CP 70–1133 across all three locations. However, CP 94–2059 and CP 94–1100 had high mean TS/H yields last year at these locations. CP 94–2059 yielded significantly more TS/H than CP

70–1133 on the successively planted field at Okeelanta, significantly less TS/H than CP 70–1133 on the Torry muck at Eastgate, and almost significantly more TS/H than CP 70–1133 on the sand at Hilliard (table 12). CP 94–1100 and CP 70–1133 had similar TS/H yields at all three locations. CP 94–1340 also had high TS/H yields at all three locations. CP 94–1607, a clone being increased specifically for sand soils, had similar KS/T, TC/H, and TS/H yields to CP 70–1133 on the sand at Hilliard (tables 11 and 12).

Second-Ratoon Crop, CP 94 Series

CP 94–2059 yielded significantly more TC/H than all clones (table 13) and significantly more TS/H than all clones, except CP 94–1100 (table 15). The TC/H and TS/H yields of CP 94–2059 were relatively stable across locations; at most locations, CP 94–2059 yielded significantly more TC/H or TS/H than CP 70–1133. The mean KS/T yield of CP 94–2059 was significantly lower than that of CP 70–1133 (table 14). CP 94–2059 also yielded high TC/H and TS/H yields combined with low KS/T yields in the plant-cane and first-ratoon crops (Glaz et al. 2000 and 2001).

The mean TC/H and TS/H yields of CP 94–1100 were also significantly higher than those of all other clones, except CP 94–2059 (tables 13 and 15). The mean KS/T yield of CP 94–1100 was similar to that of CP 70–1133 (table 14). CP 94–1100 also had relatively stable yields across locations, although its TC/H and TS/H yields on the sand soil at Lykes were mediocre (tables 13 and 15). CP 94–1100 had high plant-cane yields 2 years ago (Glaz et al. 2000) and moderate plant-cane and first-ratoon yields last year (Glaz et al. 2001).

CP 94–1447 also yielded significantly more TC/H and TS/H than CP 70–1133 (tables 13 and 15). The KS/T yield of CP 94–1447 was low but not significantly different from that of CP 70–1133 (table 14). This is the first stage IV harvest in which CP 94–1447 had significantly higher yields than CP 70–1133. CP 94–1607 is also being increased by the Florida Sugar Cane League, Inc., for potential release (table 1). The primary interest in this clone was for high yields on sand soil. However, in this year's second-ratoon yields, the TC/H, KS/T, and TS/H yields of CP 94–1607 were mediocre on the sand soil at Lykes (tables 13-15). CP 94–1340 was released for commercial production in Florida (table 1). This year, CP 94–1340 had a low TS/H mean yield, much lower than the mean yields of CP 94–2059 and CP 94–1100 but not significantly different from that of CP 70–1133. The TS/H yield of CP 94–1340 was particularly low on the sand soil at Lykes (table 15).

CP 94–1340 and CP 94–1100 were released for commercial production in Florida (table 1). In addition to CP 94–1607, seed cane of CP 94–2059 is also being increased for potential commercial release. CP 94–1340 and CP 94–2059 had favorable rankings for tolerance to cold temperature, whereas CP 94–1607 and CP 94–1100 ranked similarly to CP 70–1133 for this characteristic (table 19). All four clones were rated as either resistant enough for commercial production or with only low levels of susceptibility to smut, rust, leaf scald, and mosaic (table 1). CP 94–1340, CP 94–1100, and CP 94–1607 were all rated as susceptible to RSD. CP 94–2059 had a low level of susceptibility to RSD and a fiber percentage similar to that of CP 70–1133. CP 94–1100 and CP 94–1340 had moderately low fiber percentages and CP 94–1607 had a high fiber percentage.

Second-Ratoon Crop, CP 93 Series

When averaged across all seven locations, no clone had a significantly greater yield of TS/H than CP 70–1133, but the TS/H yield CP 93–1634 was significantly greater than the TS/H yields of six new CP 93 clones (table 18). CP 93–1634 also had consistently high TS/H yields across locations. CP 93–1634 and CP 70–1133 had similar yields of TC/H and KS/T (tables 14 and 15). CP 93–1634 had very similar yields relative to CP 70–1133 at five locations in the second-ratoon crop last year (Glaz et al. 2001). No clone from this group was released or has seed cane being considered for potential increase by the Florida Sugar Cane League, Inc.

SUMMARY

The CP 96 series was tested for the first time this year at six locations in stage IV. The outstanding new clone in this group was CP 96–1602. It had high TS/H, TC/H, and harvest KS/T yields. CP 96–1300, CP 96–1290, CP 96–1171, and CP 96–1252 also had moderately high TS/H yields. CP 96–1686 had high yields of preharvest and harvest KS/T.

This year, the CP 95 series was tested at three locations in the plant-cane crop and at six locations in the first-ratoon crop. The TS/H, TC/H, and KS/T yields of CP 70–1133 and CP 95–1039 were similar in both crop years. CP 95–1376 had high TS/H yields in the plant-cane crop and CP 95–1569 had high yields in the first-ratoon crop.

The CP 94 series was tested at three locations in the first-ratoon crop and at seven locations in the second-ratoon crop. CP 94–1100 and CP 94–2059 yielded consistently high TS/H yields in both crops across these locations. Both had high yields of TC/H and low yields of KS/T, however, the TC/H yields of CP 94–2059 were very high and its KS/T yields were very low.

The CP 93 series was tested at four locations in the second-ratoon crop this year, and no clone had outstanding yields. Four years of testing the CP 93 series were completed this year with this second-ratoon experiment. The combined 4-year results of TS/H yields of CP 93–1596, CP 93–1634, and CP 70–1133 were similar. However, neither of these new clones was released for commercial use in Florida.

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Table 1. Parentage, fiber content, and ratings of susceptibility to smut, rust, leaf scald, mosaic, and RSD for CP 70–1133 and 44 new sugarcane clones

			Rating*				
Clone	Parentage	Percent fiber	Smut	Rust	Leaf scald	Mosaic	RSD
CP 70-1133†	67 P 6 CP 56-63§	10.37	L	S	L	R	S
CP 93-1017	CP 84-1591 X CP 86-1206	11.12	L	S	L	R	R
CP 93-1065	CP 78-1610 X CP 89-2178	10.13	R	L	S	R	R
CP 93-1309	CP 81-1238 X CP 72-2086	9.39	R	R	L	L	S
CP 93-1361	90 P 19 CP 84-1591§	10.59	S	R	R	L	R
CP 93-1382	CP 82-2043 X CL 73-239	10.10	R	L	R	R	S
CP 93-1544	CP 89-2372 X LCP 82-89	11.20	L	L	L	L	R
CP 93-1548	CP 89-2372 X LCP 82-89	10.92	R	R	L	L	R
CP 93-1555	CP 89-2372 X LCP 82-89	10.31	R	L	R	L	L
CP 93-1596	91 P 13 CP 84-1714§	9.09	R	R	L	L	L
CP 93-1634	CP 83-1969 X CP 71-1240	9.96	R	R	L	L	R
CP 93-1688	CP 82-1172 X CP 86-1633	10.81	R	R	L	L	R
CP 94-1100†	CP 81-1238 X CP 88-2045	9.70	R	L	L	L	S
CP 94-1200	CP 83-1969 X CP 80-1743	10.72	S	S	L	L	R
CP 94-1292	CP 89-2375 X CP 89-2335	10.66	R	R	L	R	S
CP 94-1340†	CP 87-1733 X CP 86-1665	9.80	R	R	R	R	S
CP 94-1447	CP 71-1240 X CP 89-2335	11.01	R	R	L	R	R
CP 94-1528	91 P 13 72-2086§	10.21	L	L	R	L	S
CP 94-1607‡	CP 87-1733 X CP 85-1491	11.24	L	R	L	R	S
CP 94-1628	CP 78-1628 X CP 85-1491	12.10	R	S	L	R	L
CP 94-1855	CP 87-1733 X Pelorus	10.82	R	R	L	L	S
CP 94-2059‡	CP 87-1475 X CP 85-1308	10.34	R	R	L	L	L
CP 94-2095	CP 87-1737 X CP 72-1210	9.98	R	R	L	L	R
CP 94-2203	US 90-1072 X CP 80-1827	12.82	L	R	L	L	U
CP 95-1039‡	US 90-0017 X 95 P 09§	10.22	L	R	R	R	R
CP 95-1376	CP 91-0534 X HoCP 85-845	10.88	R	R	R	S	R
CP 95-1429	CP 89-1945 X 95 P 16§	10.88	L	R	R	L	R
CP 95-1446	ROC 12 X 95 P 17§	10.26	L	R	U	L	S
CP 95-1569‡	CP 89-1268 X CP 88-1834	11.74	R	R	L	R	L
CP 95-1570	CP 90-1428 X CP 88-1834	9.81	R	R	L	R	L
CP 95-1712	CP 65-0357 X CP 87-1628	11.36	S	L	L	R	S
CP 95-1726‡	CP 81-1238 X CP 85-1308	10.70	S	R	R	L	R
CP 95-1834	CP 87-1733 X CP 85-1491	10.00	R	L	R	R	R
CP 95-1913	US 90-1011 X CP 72-2086	12.03	R	R	R	R	R
CP 96-1161	CP 75-1091 X CP 78-1628	10.54	S	S	R	L	R
CP 96-1171‡	CP 83-1770 X CP 80-1827	8.58	L	R	L	R	L
CP 96-1252‡	CP 90-1533 X CP 84-1198	9.42	R	L	U	R	R
CP 96-1253	CP 90-1533 X CP 84-1198	8.91	R	R	L	L	L
CP 96-1288	TCP 90-4094 X TCP 90-4121	9.20	L	R	L	S	R
CP 96-1290‡	TCP 90-4094 X TCP 90-4121	9.48	L	R	L	R	R
CP 96-1300‡	CP 89-2376 X CP 72-1210	10.71	S	L	L	L	S
CP 96-1350‡	CP 89-1717 X CP 85-1432	8.78	R	L	L	R	R
CP 96-1602‡	CP 81-1425 X 94 P 03§	9.58	S	R	L	R	L
CP 96-1686‡	CP 85-1382 X 94 P 05§	10.44	R	R	L	R	R
CP 96-1865	Green German X CP 70-1133	12.60	R	L	R	L	S

* R = resistant enough for commercial production; L = low levels of disease susceptibility; S = too susceptible for production; U = undetermined susceptibility (available data not sufficient to determine the level of susceptibility).
† Released for commercial production in Florida.
‡ Seed cane currently being increased by Florida Sugar Cane League, Inc., for potential release.
§ 67 P 6 = 6th polycross made in 1967 crossing season. Female parent (CP 56–63) exposed to pollen from many clones; therefore, male parent of CP 70–1133 unknown. Similar explanations for CP 93–1361, CP 93–1596, CP 94–1528, CP 94–1855, CP 95–1039, CP 95–1429, CP 95–1446, CP 96–1602, and CP 96–1686.

Table 2. Yields of cane (in metric tons per ha—TC/H) from plant cane on Lauderhill muck, Pahokee muck, Tierra Ceia muck, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date							
	Lauderhill muck		Pahokee muck		Tierra Ceia muck	Pompano fine sand		
	Wedgworth	Okeelanta	SFCE	Knight	SFCW	Lykes Bros.		Mean yield,
Clone	12/19/00	2/05/01	12/11/00	12/27/00	1/02/01	12/05/00	Stability*	all farms
CP 96-1290	224.74	228.38	192.72	199.19	202.72	172.29	3831.97	203.34
CP 96-1602	241.30	200.64	206.57	167.25	225.02	167.08	2479.17	201.31
CP 96-1300	191.50	207.33	213.01	209.44	226.89	150.30	4103.36	199.74
CP 96-1161	191.68	157.16	220.92	191.23	218.77	173.82	2752.11	192.26
CP 70-1133	233.43	188.79	207.32	163.84	197.58	153.14	1851.66	190.68
CP 96-1252	192.05	190.35	190.53	162.29	193.99	168.32	962.83	182.92
CP 96-1171	184.50	152.42	182.12	185.40	192.34	191.21	4156.75	181.33
CP 96-1350	186.97	136.21	202.73	172.24	186.92	140.83	1908.13	170.98
CP 96-1288	166.18	158.60	178.44	156.24	170.52	143.43	364.69	162.23
CP 96-1686	212.01	139.57	182.71	124.67	159.82	141.84	3784.54	160.10
CP 96-1253	186.81	148.49	177.20	139.59	158.37	134.67	359.46	157.52
CP 96-1865	158.36	133.19	186.13	145.99	159.24	114.81	1171.59	149.62
Mean	197.46	170.10	195.03	168.11	191.01	154.31	2310.52	179.34
LSD† ($p = 0.1$)	29.69	19.39	27.90	25.19	20.08	21.90		16.42
CV‡ (%)	18.06	13.69	17.19	18.00	12.63	17.05		16.30

*Stability for each clone is calculated at $p = 0.10$ by Shukla's stability-variance parameter.
†*LSD* for location means of cane yield = 7.47 TC/H at $p = 0.10$.
‡*CV* = coefficient of variation.

Table 3. Preharvest theoretical recoverable 96° sugar (in kg per metric ton of cane—KS/T) from plant cane on Lauderhill muck, Pahokee muck, Tierra Ceia muck, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date								
	Lauderhill muck		Pahokee muck			Tierra Ceia muck	Pompano fine sand		
	Wedgworth	Okeelanta	Duda	SFCE	Knight	SFCW	Lykes Bros.		Mean yield,
Clone	12/19/00	2/05/01	10/12/00	12/11/00	12/27/00	1/02/01	12/05/00	Stability*	all farms
CP 96-1686	121.5	117.5	75.2	118.6	128.9	109.1	124.8	253.9	113.7
CP 96-1253	101.7	107.9	93.7	115.5	114.6	113.6	119.8	352.5	109.6
CP 96-1350	99.0	94.8	55.3	120.0	106.4	109.4	128.3	323.9	101.9
CP 96-1252	85.8	109.5	69.7	101.2	96.9	103.3	139.4	147.9	100.8
CP 96-1865	115.2	104.7	69.5	82.8	109.8	98.8	124.4	221.4	100.7
CP 96-1602§	93.0	114.6	52.5	112.5	80.4	109.3	133.1	354.3	99.3
CP 96-1290	102.7	114.6	61.8	92.5	97.0	86.1	126.3	122.7	97.3
CP 96-1300	86.3	109.8	69.2	86.2	99.9	102.3	123.0	73.5	96.7
CP 96-1161	95.3	114.9	52.0	85.6	95.4	100.2	131.4	95.0	96.4
CP 96-1171	97.6	110.1	46.7	75.2	91.9	112.7	132.6	292.3	95.3
CP 70-1133	95.3	102.6	48.6	89.3	83.5	97.0	125.8	66.0	91.7
CP 96-1288	83.5	95.9	58.7	66.1	93.1	98.3	91.2	320.5	83.8
Mean	98.1	108.1	62.7	95.5	99.8	103.4	125.0	218.7	98.9
LSD† ($p = 0.1$)	21.2	12.5	44.4	11.2	16.4	8.5	14.8		9.3
CV‡ (%)	12.0	6.4	39.4	6.5	9.2	4.6	6.6		12.2

*Stability for each clone is calculated at $p = 0.10$ by Shukla's stability-variance parameter.
†*LSD* for location means of sugar yield = 8.1 KS/T at $p = 0.10$.
‡*CV* = coefficient of variation.
§Investigation currently being conducted to determine whether clone planted at Duda was a clone other than CP 96–1602.

Table 4. Theoretical recoverable 96° sugar (in kg per metric ton of cane—KS/T) from plant cane on Lauderhill muck, Pahokee muck, Tierra Ceia muck, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date							
	Lauderhill muck		Pahokee muck		Tierra Ceia muck	Pompano fine sand		
	Wedgworth	Okeelanta	SFCE	Knight	SFCW	Lykes Bros.		Mean yield,
Clone	12/19/00	2/05/01	12/11/00	12/27/00	1/02/01	12/05/00	Stability*	all farms
CP 96-1686	120.7	117.1	129.7	119.8	127.8	137.3	58.4	125.4
CP 96-1602	122.3	123.4	130.4	109.0	127.0	135.1	237.0	124.5
CP 96-1253	117.9	119.8	127.4	120.5	123.4	135.9	1.6	124.2
CP 96-1288	116.8	119.0	127.8	120.4	119.5	139.8	62.3	123.9
CP 96-1350	120.4	116.3	126.2	120.9	123.1	135.8	57.0	123.8
CP 96-1171	115.2	121.1	117.2	119.1	126.9	137.8	176.6	122.9
CP 96-1252	118.0	114.5	122.0	110.5	123.4	134.9	81.4	120.6
CP 96-1300	105.0	115.9	121.9	118.6	125.3	132.0	232.3	119.8
CP 96-1290	107.2	120.8	117.9	105.7	112.4	139.2	371.4	117.2
CP 96-1865	113.4	111.3	125.7	112.8	116.1	123.5	162.6	117.2
CP 70-1133	106.6	113.9	118.2	116.2	114.5	132.7	102.9	117.0
CP 96-1161	113.3	120.6	119.0	105.5	111.3	120.4	326.0	115.0
Mean	114.7	117.8	123.6	114.9	120.9	133.7	155.8	120.9
LSD† ($p = 0.1$)	6.6	4.8	5.6	5.8	4.5	6.5		4.3
CV‡ (%)	6.9	4.9	5.4	7.0	4.5	5.8		5.7

*Stability for each clone is calculated at $p = 0.10$ by Shukla's stability-variance parameter.
†*LSD* for location means of cane yield = 2.4 KS/T at $p = 0.10$.
‡*CV* = coefficient of variation.

Table 5. Theoretical recoverable 96° sugar (in metric tons per hectare—TS/H) from plant cane on Lauderhill muck, Pahokee muck, Tierra Ceia muck, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date							
	Lauderhill muck		Pahokee muck		Tierra Ceia muck	Pompano fine sand		
	Wedgworth	Okeelanta	SFCE	Knight	SFCW	Lykes Bros.		Mean yield, all farms
Clone	12/19/00	2/05/01	12/11/00	12/27/00	1/02/01	12/05/00	Stability*	
CP 96-1602	29.587	24.757	26.954	18.221	28.741	22.666	75.785	25.154
CP 96-1300	20.058	23.999	25.992	24.838	28.485	19.772	104.357	23.857
CP 96-1290	24.068	27.666	22.748	21.146	22.662	24.015	92.656	23.717
CP 96-1171	21.277	18.413	21.262	22.218	24.406	26.356	96.435	22.322
CP 70-1133	25.029	21.501	24.657	19.044	22.629	20.258	8.312	22.186
CP 96-1252	22.515	21.836	23.500	17.990	23.970	22.885	14.140	22.116
CP 96-1161	21.622	18.886	26.341	20.317	24.179	20.977	12.088	22.054
CP 96-1350	22.623	15.853	25.391	20.817	23.041	19.074	38.631	21.133
CP 96-1288	19.444	18.929	22.897	18.958	20.393	20.077	8.051	20.116
CP 96-1686	25.668	16.389	23.751	15.005	20.489	19.378	63.960	20.113
CP 96-1253	21.994	17.799	22.561	16.852	19.478	18.266	4.741	19.492
CP 96-1865	17.836	14.813	23.353	16.566	18.415	14.161	35.313	17.524
Mean	22.643	20.070	24.117	19.331	23.074	20.657	46.206	21.649
LSD† ($p = 0.1$)	3.794	2.464	3.774	3.353	2.675	3.179		2.321
CV‡ (%)	20.125	14.748	18.798	20.836	13.925	18.489		18.010

*Stability for each clone is calculated at $p = 0.10$ by Shukla's stability-variance parameter.
†*LSD* for location means of cane yield = 0.941 KS/T at $p = 0.10$.
‡*CV* = coefficient of variation.

Table 6. Preharvest and harvest yields of theoretical recoverable 96° sugar (in kg per metric ton of cane—KS/T) from plant cane on Lauderhill muck, Torry muck, and Malabar sand

	Preharvest yield by soil type, farm, and sampling date				Harvest yield by soil type, farm, and sampling date			
	Lauderhill muck	Torry muck	Malabar sand		Lauderhill muck	Torry muck	Malabar sand	
Clone	Okeelanta 10/23/00	Eastgate 10/12/00	Hilliard 10/25/00	Mean yield, all farms	Okeelanta 12/07/00	Eastgate 3/18/01	Hilliard 10/25/00	Mean yield, all farms
CP 95-1376	112.8	76.2	130.4	106.5	133.6	94.7	135.6	121.3
CP 95-1039	110.6	102.5	118.9	110.7	136.5	93.7	127.8	119.3
CP 70-1133	117.1	56.0	112.1	95.1	133.4	83.4	130.8	115.8
CP 95-1446	115.2	103.7	116.4	111.8	130.2	87.1	125.0	114.1
CP 94-2203	113.2	109.4	120.0	114.2	129.6	78.5	129.7	112.6
CP 95-1429	101.2	87.3	121.6	103.4	131.5	64.2	135.3	110.3
CP 95-1913	83.5	67.1	106.2	85.6	122.4	83.8	119.9	108.7
CP 95-1726	85.4	103.5	116.7	101.9	132.1	71.4	119.6	107.7
CP 95-1712	104.5	91.9	110.4	102.3	125.0	73.3	123.6	107.3
CP 95-1834	88.9	107.5	115.5	103.9	128.7	70.2	121.4	106.7
CP 95-1569	107.7	94.6	118.3	106.9	130.9	64.0	121.3	105.4
CP 95-1570	96.0	92.1	120.1	102.7	127.5	59.0	118.5	101.7
Mean	103.0	91.0	117.2	103.7	130.1	76.9	125.7	110.9
*LSD** ($p = 0.1$)	27.8	38.8	23.0	16.7	5.5	14.9	5.9	8.2
CV†(%)	15.0	23.7	10.9	16.4	5.1	16.2	5.7	6.9

**LSD* for location means of preharvest yields = 9.2 KS/T and of harvest yields = 2.9 KS/T.
†*CV* = coefficient of variation.

Table 7. Yields of cane and of theoretical recoverable 96° sugar (in metric tons per ha—TC/H and TS/H) from plant cane on Lauderhill muck, Torry muck, and Malabar sand

	Cane yield by soil type, farm, and sampling date				Sugar yield by soil type, farm, and sampling date			
	Lauderhill muck	Torry muck	Malabar sand		Lauderhill muck	Torry muck	Malabar sand	
Clone	**Okeelanta 12/07/00**	**Eastgate 3/18/01**	**Hilliard 10/25/00**	**Mean yield, all farms**	**Okeelanta 12/07/00**	**Eastgate 3/18/01**	**Hilliard 10/25/00**	**Mean yield, all farms**
CP 95-1376	143.16	238.67	143.45	175.09	19.049	22.313	19.452	20.271
CP 94-2203	154.16	263.76	136.00	184.64	19.901	21.262	17.859	19.674
CP 95-1039	107.45	250.51	152.42	170.12	14.715	23.811	19.654	19.393
CP 95-1569	133.93	237.16	185.58	185.56	17.639	15.106	22.554	18.433
CP 70-1133	139.95	209.81	124.60	158.12	18.648	17.322	16.334	17.435
CP 95-1429	130.10	235.62	146.18	170.63	17.141	15.301	19.826	17.422
CP 95-1913	124.77	232.36	139.22	165.45	15.265	19.436	16.835	17.179
CP 95-1712	146.01	195.71	134.79	158.84	18.175	14.412	16.745	16.444
CP 95-1834	137.94	216.74	132.19	162.29	17.748	15.203	16.159	16.370
CP 95-1570	135.18	234.40	134.22	167.93	17.206	13.711	15.915	15.611
CP 95-1446	76.83	169.47	143.92	130.07	10.024	14.859	17.949	14.277
CP 95-1726	93.24	197.38	111.38	134.00	12.239	14.019	13.215	13.157
Mean	126.89	223.46	140.33	163.56	16.479	17.230	17.708	17.139
*LSD** (p = 0.1)	15.06	52.58	22.80	25.61	1.989	5.852	3.118	3.452
CV†(%)	14.26	19.66	19.52	18.48	14.498	28.381	21.151	20.523

**LSD* for location means of cane yield = 14.89 TC/H and of sugar yield = 1.864 TS/H.
†*CV* = coefficient of variation.

Table 8. Yields of cane (in metric tons per ha—TC/H) from first-ratoon cane on Lauderhill muck, Pahokee muck, Tierra Ceia muck, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date							
	Lauderhill muck			Pahokee muck	Tierra Ceia muck	Pompano fine sand		
	Wedgworth	Knight	SFCE	Okeelanta	SFCW	Lykes Bros.		Mean yield,
Clone	10/30/00	11/1/00	12/10/00	12/26/00	11/1/00	10/18/00	Stability*	all farms
CP 95-1569	217.74	202.13	204.20	190.08	228.35	111.69	704.33	192.36
CP 95-1570	187.93	186.44	175.91	207.16	208.81	100.78	763.62	177.84
CP 95-1039	194.43	197.69	154.67	173.21	231.73	103.35	3372.21	175.85
CP 95-1712	184.99	186.12	155.70	185.58	204.44	103.03	985.58	169.97
CP 70-1133	199.73	166.74	185.19	184.77	177.05	98.13	1538.28	168.60
CP 94-2203	192.61	149.03	165.88	177.67	202.21	99.90	910.79	164.55
CP 95-1446	183.98	149.37	162.99	178.35	194.57	94.64	459.95	160.65
CP 95-1913	143.90	176.91	167.45	169.18	198.32	95.25	2691.59	158.50
CP 95-1726	178.87	170.00	155.05	169.22	179.47	75.41	444.51	154.67
CP 95-1429	181.56	158.78	167.84	179.03	160.13	80.24	1738.09	154.60
CP 95-1834	154.85	123.27	156.15	155.12	161.62	75.14	1144.84	137.69
CP 95-1376	156.16	129.02	163.49	130.29	187.28	57.42	2459.90	137.28
Mean	181.40	166.29	167.88	174.97	194.50	91.25	1434.47	162.71
LSD† ($p = 0.1$)	22.07	23.86	23.17	21.32	20.13	18.83		12.93
CV‡ (%)	14.62	17.23	16.58	14.64	12.43	24.79		15.97

*Stability for each clone is calculated at $p = 0.10$ by Shukla's stability-variance parameter.
†*LSD* for location means of cane yield = 8.73 TC/H at $p = 0.10$.
‡*CV* = coefficient of variation.

Table 9. Theoretical recoverable 96° sugar (in kg per metric ton of cane—KS/T) from first-ratoon cane on Lauderhill muck, Pahokee muck, Tierra Ceia muck, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date							
	Lauderhill muck			Pahokee muck	Tierra Ceia muck	Pompano fine sand		
	Wedgworth	Knight	SFCE	Okeelanta	SFCW	Lykes Bros.		Mean yield,
Clone	10/30/00	11/1/00	12/10/00	12/26/00	11/1/00	10/18/00	Stability*	all farms
CP 95-1726	130.0	111.7	128.8	137.5	124.6	113.3	139.5	124.3
CP 95-1446	124.0	103.7	128.4	130.2	129.2	104.8	274.5	120.0
CP 95-1376	120.6	108.6	130.8	129.9	118.5	111.1	37.2	119.9
CP 95-1039	112.4	108.5	128.0	128.8	121.0	112.9	85.7	118.6
CP 70-1133	113.3	108.0	124.0	122.7	122.7	110.8	99.8	116.9
CP 95-1429	125.2	95.8	130.7	123.1	118.7	104.5	377.4	116.3
CP 94-2203	112.6	106.4	121.1	123.1	117.1	111.4	65.1	115.3
CP 95-1569	113.5	106.2	119.6	123.4	119.8	103.6	102.9	114.3
CP 95-1712	108.4	99.7	118.5	121.4	110.0	117.3	319.8	112.5
CP 95-1834	114.1	93.2	119.2	122.1	112.9	101.8	61.7	110.5
CP 95-1570	107.5	92.6	123.2	119.9	108.9	106.2	117.4	109.7
CP 95-1913	101.0	90.2	106.6	111.5	101.7	103.1	140.9	102.3
Mean	115.2	102.0	123.2	124.5	117.1	108.4	151.8	115.1
LSD† (p = 0.1)	4.5	8.8	4.7	5.6	5.2	12.7		4.2
CV‡ (%)	4.7	10.4	4.6	5.4	5.3	14.1		7.9

*Stability for each clone is calculated at $p = 0.10$ by Shukla's stability-variance parameter.
†*LSD* for location means of cane yield = 3.0 KS/T at $p = 0.10$.
‡*CV* = coefficient of variation.

Table 10. Theoretical recoverable 96° sugar (in metric tons per hectare—TS/H) from first-ratoon cane on Lauderhill muck, Pahokee muck, Tierra Ceia muck, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date							
	Lauderhill muck			Pahokee muck	Tierra Ceia muck	Pompano fine sand		
	Wedgworth	Knight	SFCE	Okeelanta	SFCW	Lykes Bros.		Mean yield,
Clone	10/30/00	11/1/00	12/10/00	12/26/00	11/1/00	10/18/00	Stability*	all farms
CP 95-1569	24.659	21.559	24.351	23.525	27.396	11.682	13.464	22.195
CP 95-1039	21.857	21.376	19.882	22.305	27.991	11.551	49.348	20.827
CP 70-1133	22.598	18.064	23.006	22.657	21.757	10.749	9.625	19.805
CP 95-1570	20.253	17.512	21.706	24.968	22.790	10.815	14.324	19.674
CP 95-1446	22.834	15.613	20.894	23.240	25.163	9.818	17.339	19.593
CP 95-1726	23.294	19.046	19.663	23.254	22.321	8.403	23.860	19.330
CP 94-2203	21.769	16.094	20.105	21.914	23.682	11.202	5.258	19.128
CP 95-1712	20.021	18.590	18.381	22.568	22.442	12.251	25.231	19.042
CP 95-1429	22.773	15.200	21.898	22.028	19.028	8.381	40.244	18.218
CP 95-1376	18.893	14.008	21.399	16.960	22.122	6.230	37.544	16.602
CP 95-1913	14.614	15.962	17.975	18.895	20.196	10.077	43.632	16.286
CP 95-1834	17.696	11.616	18.557	18.974	18.176	7.571	14.378	15.432
Mean	20.938	17.053	20.652	21.774	22.755	9.894	24.521	18.844
LSD† ($p = 0.1$)	2.701	3.213	2.713	3.012	2.549	2.334		1.691
CV‡ (%)	15.500	22.640	15.781	16.617	13.455	28.340		17.651

*Stability for each clone is calculated at $p = 0.10$ by Shukla's stability-variance parameter.
†*LSD* for location means of cane yield = 1.092 TS/H at $p = 0.10$.
‡*CV* = coefficient of variation.

Table 11. Theoretical recoverable yields of 96° sugar (in kg per metric ton of cane—KS/T) from first-ratoon cane on Lauderhill muck, Malabar sand, and Torry muck

	Mean yield by soil type, farm, and sampling date			
	Lauderhill muck	Torry muck	Malabar sand	
Clone	Okeelanta 12/7/00	Eastgate 1/23/01	Hilliard 10/25/00	Mean yield, all farms
CP 94-1340	127.8	126.4	119.8	124.7
CP 94-2095	126.4	125.9	121.3	124.5
CP 94-1100	123.9	117.7	120.6	120.7
CP 94-1447	117.8	121.2	118.8	119.2
CP 94-1855	121.8	125.0	109.4	118.7
CP 70-1133	125.5	116.5	113.5	118.5
CP 94-1292	116.5	122.9	113.6	117.7
CP 94-1528	121.3	109.2	118.6	116.4
CP 94-2059	121.3	120.0	104.2	115.1
CP 94-1200	111.7	119.3	113.4	114.8
CP 94-1628	118.2	116.7	107.7	114.2
CP 94-1607	118.8	107.8	111.5	112.7
Mean	120.9	119.0	114.4	118.1
*LSD** ($p = 0.1$)	5.3	5.2	11.0	6.5
CV† (%)	5.2	5.2	10.0	6.7

**LSD* for location means = 2.9 KS/T at $p = 0.10$.
†*CV* = coefficient of variation.

Table 12. Yields of cane and of theoretical recoverable 96° sugar (in metric tons per ha—TC/H and TS/H) from first-ratoon cane on Lauderhill muck, Torry muck, and Malabar sand

	Cane yield by soil type, farm, and sampling date				Sugar yield by soil type, farm, and sampling date			
	Lauderhill muck	Torry muck	Malabar sand		Lauderhill muck	Torry muck	Malabar sand	
Clone	Okeelanta 12/07/00	Eastgate 1/23/01	Hilliard 10/25/00	Mean yield, all farms	Okeelanta 12/07/00	Eastgate 1/23/01	Hilliard 10/25/00	Mean yield, all farms
CP 94-1100	170.73	196.18	85.20	150.70	21.195	23.061	10.368	18.208
CP 94-2059	191.86	149.89	120.43	154.06	23.394	17.975	12.613	17.994
CP 94-2095	142.72	188.14	98.54	143.14	18.039	23.703	12.030	17.924
CP 70-1133	149.77	200.10	91.85	147.24	18.831	23.207	10.593	17.544
CP 94-1528	159.67	196.87	96.59	151.04	19.367	21.467	11.455	17.430
CP 94-1340	129.10	169.13	101.28	133.17	16.507	21.387	12.218	16.704
CP 94-1447	151.78	140.87	113.15	135.26	17.990	17.057	13.483	16.177
CP 94-1607	173.91	146.70	97.66	139.42	20.679	15.893	10.927	15.833
CP 94-1292	133.39	172.42	81.75	129.18	15.633	21.236	9.364	15.411
CP 94-1200	152.14	150.77	87.88	130.26	17.281	18.031	10.059	15.124
CP 94-1628	171.74	82.47	95.58	116.60	20.199	9.799	10.413	13.470
CP 94-1855	153.42	103.19	69.93	108.85	18.689	13.032	7.826	13.182
Mean	156.68	158.06	94.98	136.58	18.984	18.821	10.946	16.250
*LSD**(p = 0.1)	26.04	21.45	19.96	36.68	3.382	2.717	2.915	4.217
CV† (%)	19.96	16.30	21.75	19.08	21.400	17.340	27.569	21.045

**LSD* for location means of cane yield = 11.15 TC/H and of sugar yield = 1.390 TS/H.
†*CV* = coefficient of variation.

Table 13. Yields of cane (in metric tons per ha—TC/H) from second-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date								
	Dania muck	Lauderhill muck		Pahokee muck		Pompano fine sand			
	Duda	Okeelanta	SFCE	Wedgworth	Knight	SFCW	Lykes Bros.		Mean yield,
Clone	10/27/00	10/14/00	10/16/00	10/21/00	10/20/00	11/1/00	10/18/00	Stability*	all farms
CP 94-2059	94.75	166.68	201.64	180.57	155.14	174.74	139.55	3009.55	159.01
CP 94-1100	103.01	164.18	176.38	154.58	129.52	165.01	123.82	1876.10	145.21
CP 94-1447	90.78	123.71	157.22	155.26	120.14	149.46	137.05	-141.72	133.38
CP 94-1628	94.78	112.02	146.28	156.77	146.08	142.52	134.11	2037.24	133.22
CP 94-1200	75.13	149.30	101.27	171.84	126.22	155.43	148.66	7385.00	132.55
CP 94-1607	93.07	114.20	144.82	153.55	129.75	124.08	132.75	1256.48	127.46
CP 94-2095	67.28	116.71	143.57	162.38	79.15	136.06	141.50	2134.00	120.95
CP 70-1133	69.88	97.23	154.94	153.03	87.33	126.35	136.43	1907.93	117.88
CP 94-1292	99.61	76.65	150.86	136.71	100.62	127.60	120.86	3487.11	116.13
CP 94-1340	75.72	125.12	126.59	127.85	82.02	131.51	67.58	4238.75	105.20
CP 94-1855	65.58	95.95	142.23	126.50	80.53	117.53	92.80	638.77	103.02
CP 94-1528	57.37	67.41	83.00	117.98	41.24	86.87	91.67	2256.36	77.93
Mean	82.25	117.43	144.07	149.75	106.48	136.43	122.23	2507.13	122.66
LSD† ($p = 0.1$)	25.23	19.22	24.38	18.16	21.20	17.90	17.51		11.39
CV‡ (%)	36.85	19.66	20.33	14.57	23.91	15.76	17.20		20.30

*Stability for each clone is calculated at $p = 0.10$ by Shukla's stability-variance parameter.
†*LSD* for location means of cane yield = 12.23 TC/H at $p = 0.10$.
‡*CV* = coefficient of variation.

Table 14. Theoretical recoverable 96° sugar (in kg per metric ton of cane—KS/T) from second-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date								
	Dania muck	Lauderhill muck		Pahokee muck		Pompano fine sand			
	Duda	Okeelanta	SFCE	Wedgworth	Knight	SFCW	Lykes Bros.		Mean yield,
Clone	**10/27/00**	**10/14/00**	**10/16/00**	**10/21/00**	**10/20/00**	**11/1/00**	**10/18/00**	**Stability***	**all farms**
CP 94-2095	113.6	119.9	127.7	114.9	116.6	125.1	116.4	84.0	119.2
CP 94-1340	113.4	121.0	117.1	105.6	119.5	121.2	113.8	136.4	115.9
CP 70-1133	108.0	121.5	119.4	105.3	111.8	121.4	108.3	108.0	113.7
CP 94-1100	113.3	117.8	117.6	102.8	106.4	125.7	107.4	63.0	113.0
CP 94-1855	121.4	101.5	109.5	109.5	108.2	125.1	114.3	681.4	112.8
CP 94-1292	107.0	114.0	124.6	92.8	114.1	116.1	118.0	325.3	112.4
CP 94-1447	115.1	118.6	117.2	105.5	105.8	116.8	103.4	171.1	111.8
CP 94-1200	99.6	116.7	109.1	104.1	107.9	124.1	108.8	269.8	110.0
CP 94-1628	109.3	111.3	113.9	103.3	110.2	115.6	106.2	45.2	110.0
CP 94-2059	114.2	103.0	111.3	100.9	103.9	121.4	114.7	332.1	109.9
CP 94-1607	110.6	117.9	114.9	101.4	98.6	116.6	105.9	151.1	109.4
CP 94-1528	104.6	116.9	106.9	98.7	92.4	119.7	108.7	363.0	106.8
Mean	110.8	115.0	115.8	103.7	107.9	120.7	110.5	227.5	112.1
LSD† ($p = 0.1$)	9.3	17.0	8.4	8.3	9.9	7.7	12.3		3.5
CV‡ (%)	10.1	18.0	8.7	9.6	11.0	7.6	13.4		10.8

*Stability for each clone is calculated at $p = 0.10$ by Shukla's stability-variance parameter.
†*LSD* for location means of cane yield = 4.2 KS/T at $p = 0.10$.
‡*CV* = coefficient of variation.

Table 15. Theoretical recoverable 96° sugar (in metric tons per hectare—TS/H) from second-ratoon cane on Dania muck, Lauderhill muck, Pahokee muck, and Pompano fine sand

	Mean yield by soil type, farm, and sampling date								
	Dania muck	Lauderhill muck		Pahokee muck		Pompano fine sand			
	Duda	Okeelanta	SFCE	Wedgworth	Knight	SFCW	Lykes Bros.		Mean yield, all farms
Clone	10/27/00	10/14/00	10/16/00	10/21/00	10/20/00	11/1/00	10/18/00	Stability*	
CP 94-2059	10.753	17.137	22.568	18.324	16.512	21.240	16.064	19.735	17.514
CP 94-1100	11.657	19.417	20.818	15.972	14.022	20.744	13.248	37.341	16.554
CP 94-1447	10.359	14.787	18.422	16.328	12.641	17.520	14.047	-2.507	14.872
CP 94-1200	7.541	17.424	11.423	17.828	13.606	19.400	16.025	117.311	14.749
CP 94-1628	10.149	12.450	16.572	16.208	15.807	16.522	14.298	30.305	14.572
CP 94-2095	7.668	14.040	18.437	18.679	9.129	17.078	16.530	34.559	14.509
CP 94-1607	10.348	13.509	16.650	15.540	12.835	14.477	14.068	11.494	13.918
CP 70-1133	7.471	11.826	18.725	16.074	9.718	15.469	14.718	22.666	13.429
CP 94-1292	10.771	8.666	18.747	12.463	11.539	14.931	14.269	58.929	13.055
CP 94-1340	8.750	15.305	14.867	13.494	9.879	15.988	7.762	55.125	12.292
CP 94-1855	8.164	9.755	15.732	14.040	8.538	14.732	10.640	8.505	11.657
CP 94-1528	5.909	7.918	8.990	11.764	3.798	10.452	9.596	31.706	8.346
Mean	9.128	13.519	16.829	15.559	11.502	16.546	13.439	35.431	13.789
LSD† (p = 0.1)	2.997	3.271	3.080	2.488	2.583	2.702	2.382		1.381
CV‡ (%)	39.439	29.677	21.987	19.204	26.979	19.615	21.294		41.593

*Stability for each clone is calculated at p = 0.10 by Shukla's stability-variance parameter.
†*LSD* for location means of cane yield = 1.488 TS/H at p = 0.10.
‡*CV* = coefficient of variation.

Table 16. Yields of cane (in metric tons per ha—TC/H) from second-ratoon cane on Lauderhill muck, Pahokee muck, Torry muck, and Malabar sand

Clone	Mean yield by soil type, farm, and sampling date					Mean yield,
	Lauderhill muck	Pahokee muck	Torry muck	Malabar sand		
	SFCE 10/17/00	Okeelanta 10/26/00	1/18/01	Eastgate 10/28/00	Hilliard all farms	
CP 93-1634	142.89	119.96		164.44	90.34	129.41
CP 93-1596	96.23	113.23		192.04	95.30	124.20
CP 93-1382	142.88	125.77		160.37	65.22	123.56
CP 70-1133	146.36	104.25		147.40	91.05	122.27
CP 93-1544	156.46	93.89		164.38	64.60	119.83
CP 93-1548	121.17	95.43		159.09	73.17	112.21
CP 93-1017	133.42	103.02		114.98	92.34	110.94
CP 93-1361	115.61	101.94		137.44	88.57	110.89
CP 93-1555	121.52	82.40		149.03	87.46	110.10
CP 93-1065	133.46	94.64		155.21	53.07	109.09
CP 93-1688	135.73	97.21		111.78	81.22	106.48
CP 93-1309	98.69	90.12		128.82	79.24	99.22
Mean	128.70	101.82		148.75	80.13	114.85
*LSD** (p = 0.1)	24.80	24.76		18.10	17.97	20.58
CV†(%)	23.15	29.21		14.62	26.95	22.67

**LSD* for location means of cane yield = 8.88 TC/H at p = 0.10.
†*CV* = coefficient of variation.

Table 17. Theoretical recoverable 96° sugar (in kg per metric ton of cane—KS/T) from second-ratoon cane on Lauderhill muck, Pahokee muck, Torry muck, and Malabar sand

	Mean yield by soil type, farm, and sampling date				
	Lauderhill muck	Pahokee muck	Torry muck	Malabar sand	
Clone	SFCE 10/17/00	Okeelanta 10/26/00	Eastgate 1/18/01	Hilliard 10/28/00	Mean yield, all farms
CP 93-1548	124.1	126.5	130.8	125.5	126.7
CP 93-1309	118.1	121.8	129.6	124.9	123.6
CP 93-1634	120.3	115.7	126.9	129.7	123.2
CP 93-1544	120.5	114.4	126.0	122.8	120.9
CP 93-1688	119.4	118.6	129.4	115.8	120.8
CP 93-1555	115.6	123.1	124.2	119.3	120.5
CP 93-1065	108.6	121.7	127.0	123.3	120.1
CP 70-1133	118.4	117.9	119.4	118.6	118.6
CP 93-1017	108.9	116.5	116.5	124.1	116.5
CP 93-1361	108.0	116.5	124.2	113.9	115.6
CP 93-1596	110.8	112.9	120.9	113.5	114.5
CP 93-1382	103.0	106.0	131.0	114.8	113.7
Mean	114.6	117.6	125.5	120.5	119.6
*LSD** ($p = 0.1$)	10.7	10.4	5.1	9.3	5.3
CV† (%)	11.3	10.6	4.8	9.3	9.2

**LSD* for location means of cane yield = 5.6 KS/T at $p = 0.10$.
†*CV* = coefficient of variation.

Table 18. Theoretical recoverable 96° sugar (in metric tons per hectare—TS/H) from second-ratoon cane on Lauderhill muck, Pahokee muck, Torry muck, and Malabar sand

	Mean yield by soil type, farm, and sampling date				
	Lauderhill muck	Pahokee muck	Torry muck	Malabar sand	
Clone	SFCE 10/17/00	Okeelanta 10/26/00	Eastgate 1/18/01	Hilliard 10/28/00	Mean yield, all farms
CP 93-1634	17.200	14.092	20.834	11.892	16.004
CP 93-1544	18.813	10.816	20.684	8.035	14.587
CP 70-1133	17.282	12.342	17.521	10.910	14.514
CP 93-1596	10.661	12.642	23.188	10.932	14.356
CP 93-1548	15.076	12.127	20.828	9.142	14.293
CP 93-1382	14.903	13.285	21.053	7.532	14.193
CP 93-1555	14.605	9.903	18.470	10.430	13.352
CP 93-1065	13.972	11.548	19.763	6.564	12.962
CP 93-1361	12.525	12.062	17.073	10.085	12.936
CP 93-1017	14.550	11.989	13.401	11.659	12.900
CP 93-1688	16.134	11.472	14.457	9.477	12.885
CP 93-1309	11.644	10.903	16.661	9.909	12.279
Mean	14.780	11.932	18.661	9.714	13.772
*LSD** ($p = 0.1$)	3.351	3.119	2.339	2.451	2.563
CV†(%)	27.231	31.405	15.055	30.311	24.838

**LSD* for location means of sugar yield = 1.223 TS/H at $p = 0.10$.
†*CV* = coefficient of variation.

Table 19. Rankings by CP series of damage to juice quality by cold temperatures

CP 93 series*	Rank†	CP 94 series	Rank†	CP 95 series	Rank†	CP 96 series	Rank†
CP 70-1133	2	CP 70-1133	7	CP 70-1133	6	CP 70-1133	2
CP 93-1017	1	CP 94-1100	10	CP 94-2203‡	10	CP 96-1161	10
CP 93-1065	5	CP 94-1200	2	CP 95-1039	1	CP 96-1171	12
CP 93-1309	4	CP 94-1292	5	CP 95-1376	12	CP 96-1252	11
CP 93-1361	7	CP 94-1340	3	CP 95-1429	9	CP 96-1253	4
CP 93-1382	10	CP 94-1447	12	CP 95-1446	3	CP 96-1288	9
CP 93-1544	11	CP 94-1528	4	CP 95-1569	8	CP 96-1290	7
CP 93-1548	8	CP 94-1607	6	CP 95-1570	7	CP 96-1300	3
CP 93-1555	3	CP 94-1628	8	CP 95-1712	2	CP 96-1350	1
CP 93-1596	6	CP 94-1855	11	CP 95-1726	5	CP 96-1602	5
CP 93-1634	9	CP 94-2059	1	CP 95-1834	4	CP 96-1686	8
CP 93-1688	12	CP 94-2095	9	CP 95-1913	11	CP 96-1865	6

*CP 93 series cold tolerance rankings are from the 1999–2000 harvest season.
†The lower the numerical ranking, the better the cold tolerance.
‡CP 94-2203 was tested with the clones in the CP 95 series.

Table 20. Dates of stalk counts at 10 plant-cane, 10 first-ratoon, and 7 second-ratoon experiments

	Crop		
Location	**Plant cane**	**First ratoon**	**Second ratoon**
Duda	6/14/00		9/07/00
Eastgate	6/09/00	8/16/00	8/15/00
Hilliard	7/19/00	7/21/00	7/24/00
Knight	6/27/00	8/04/00	8/09/00
Lykes	7/12/00	9/18/00	9/14/00
Okeelanta	7/06/00	8/23/00	8/29/00
Okeelanta (successive)	8/11/00	8/25/00	9/12/00
SFCE	6/29/00	7/26/00	8/03/00
SFCW	6/30/00	7/17/00	8/07/00
Wedgworth	6/28/00	7/18/00	7/25/00